Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
https://doi.org/10.5194/amt-2022-223-RC1, 2022

Comment on amt-2022-223

Anonymous Referee #1

Referee comment on "Quality control and error assessment of the Aeolus L2B wind results from the Joint Aeolus Tropical Atlantic Campaign" by Oliver Lux et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-223-RC1, 2022

This manuscript proposes and applies Z-score-based QC procedures for the evaluation of Aeolus L2B wind retrievals. It is very well written and easy to follow. While the degree of novelty is a bit limited, the paper is certainly interesting and useful, and fits well into the scope of the journal. The results and methods are sound, and despite my best mental efforts I have only a few very minor comments, which are listed below. Finally, I want to mention that I especially appreciate the effort the authors have put into a clear language and high-quality figures, which makes the manuscript very accessible.

General comment:

The paper has a bit of a gift wrap structure. The methods and goals are only rather vaguely touched in the beginning of the introduction, and become clear more and more only as one reads on. I recommend to give a more specific outline for what the reader is to expect.

Somewhat related, I find the naming / separation of sections 3 and 4 a bit confusing. Both sections are structured pretty much identically, Sec. 3 showing results for the model evaluation against ECMWF, Sec. 4 showing results for the AVATAR-T evaluation. The methods are indeed introduced in Sec. 3 as the name suggests, but it is somewhat of a results / methods hybrid.

I can see the benefit of introducing the methods on the examples with ECMWF, but I think a dedicated methods-only section that gives a summary (perhaps even a schematic figure?) of all methods that are going to be used could help the reader to have a clear picture on what to expect. As mentioned earlier, right now the exact methodology reveals itself only over long stretches of the manuscript.

Specific comments:

L25: I find the term "biased gross errors" a bit unusual and unclear.

L68: Is a Gaussian distribution actually appropriate for wind retrievals? Since wind speed is a bound variable, shouldn't the error distribution get more and more skewed as the retrievals get closer to the limit? I appreciate this is a common assumption for many variables that has also some practical reasons, but since such a strong focus is put on forcing the data into a normal distribution, some words on that might be helpful.

L91-93: This statement is distracting and unnecessary here. Also, I have the impression that "Rayleigh-clear" and "Mie-cloudy" are used more often than not later on, so perhaps just delete this statement altogether (or stick with the simple notation consistently, which I'd actually prefer).

L103: Where does this strong signal decrease over time actually come from?

L121/L321: "Whereas" is a rather unusual conjuction to start a sentence with and sounds a bit awkward to me. Perhaps better use "while"?

L297: "the distribution is far from normal" sounds a bit funny to me. Perhaps better "far from Gaussian"?

L298: The value of 3.5 seems purely empirical. What was the decision criterion of Iglewicz and Hoaglin (1993), and is it likely to make it a good choice for your study as well?

L335: remove the comma after "Gaussian distribution"

L345: ECMWF are considered as absolute "truth" in the presented analyses. I'm wondering how likely it is that some of the supposed "gross errors" are actual rare extreme wind occurences that were not modelled properly but captured correctly by the observations?

L352: Perhaps change to "it was *assumed* that"?

L386: Is 10 ms-1 a commonly used threshold? Perhaps add a rationale / reference?

L429/Fig 6.: The graph contains a whole lot of information which is hard to grasp as a whole. Perhaps add a more high-level description of what the purpose of the plot is before describing the axes and lines, etc. specifically?

L499: Perhaps change to "1:1 line"?

L573: There are no orange bars. I assume this should be "black bars"?

L599: Replace "On the contrary" with "In contrast"?

L639: The presented graph is a great way to summarize and visualize a lot of information, but I, personally, find it a bit exaggarated to call it "developing a new graph". I think it just draws the attention a bit away from the actually interesting part, which is the proposed systematic approach for selecting an EE threshold in a somewhat more objective manner.

L654-657: I'm wondering how the statistics against ECMWF predictions would look like when using only the exact same locations as those in the AVATAR-T campaign? That is, how much of the mentioned deviations are just related to spatial representativeness?

L670-- I find the concluding remarks straying a bit off-topic.